

bivariant copolymers sufficient to incrementally establish quantitative structure-property correlations, said copolymer library consisting of different strictly alternating A-B type copolymers each separately polymerized in parallel under essentially the same polymerization conditions from monomers consisting essentially of:

(1) a first monomer selected from the group consisting of a first homologically varying series of monomers with the same polymerizable functionable groups; and

(2) a second monomer selected from the group consisting of a homologically varying series of second monomers having the same polymerizable functionable groups that are reactive with the polymerizable functional groups of said first series of monomers to form strictly alternating A-B type copolymers;

wherein (A) said homologous variations of said first and second monomer series are selected to be complimentary to one another so that the homologous variations of said first monomer series have a different influence on polymer properties than the homologous variations of said second monomer series; and

(B) the monomers within each monomer series are selected to have comparable reactivities at said polymerizable functional groups to permit the same polymerization conditions to be employed for each parallel synthesis reaction in a way that results in all polymers being of sufficiently high molecular weight and similar polydispersity.

10. (Twice Amended) A condensation polymer library comprising a number of homologously bivariant copolymers sufficient to incrementally establish quantitative structure-property correlations, said copolymer library consisting of strictly alternating A- B type copolymers each separately polymerized in parallel under essentially the same polymerization conditions from monomers consisting essentially of:

(1) a first monomer selected from the group consisting of a first series of monomers homologously varying along the monomer backbone and having the same polymerizable functional groups; and

02 (2) a second monomer selected from the group consisting of a second series of monomers with one homologously varying substituent group and having the same polymerizable functional groups that are reactive with the polymerizable functional groups of said first series of monomers to condense to form said strictly alternating A-B type copolymers;

wherein the monomers within each monomer series are selected to have comparable reactivities at said polymerizable functional groups to permit the same polymerization conditions to be employed for each parallel synthesis reaction in a way that results in all polymers being of sufficiently high molecular weight and similar polydispersity.

REMARKS

This amendment is submitted with a Request for Continuing Examination, and is in response to the outstanding final Official Action mailed July 5, 2002. In view of the above claim amendments and the remarks which follow, reconsideration and allowance of this application is respectfully requested.

Claims 1 and 10 have been amended to more particularly point out and distinctly claim the subject matter that applicants' regard as the invention, and to define over the prior art cited. In particular, both claims have been amended to state that the polymer libraries contain a number of homologously bivariant copolymers sufficient to incrementally establish quantitative structure-property correlations. Homologously bivariant copolymer libraries are disclosed, for example, from page 10, line 14 to page 11, line 6. A number of polymers to sufficiently incrementally establish quantitative structure-property correlations is disclosed from page 22, line 29 to page 23, line 3. Incrementally quantitative structure-property correlations are shown in Tables I-IV. These claim amendments therefore do not introduce new matter.

Claims 1 and 10 have also been amended to limit the subject matter claimed to only strictly alternating A-B type copolymers separately polymerized in parallel under essentially the same polymerization conditions. Strictly alternating A-B type copolymers are disclosed at page 10, lines 15-16. Parallel polymerization conditions are disclosed at page 4, line 18. Preparing

each library polymer under the same polymerization conditions is disclosed at page 10, lines 26-28 and at page 23, lines 3-5.

Claims 1 and 10 have also been amended to state that the monomers within each monomer series are selected to have comparable reactivities at the polymerizable functional groups to permit the same polymerization conditions to be employed for each parallel synthesis reaction in a way that results in all polymers being of sufficiently high molecular weight and similar polydispersity. This is disclosed in the specification from page 22, line 29 to page 23, line 5, as well as at page 10, lines 24-28, and also does not introduce new matter.

Claim 1 has been further amended to state that the homologous variations of the first and second monomer series are selected to be complimentary to one another so that the homologous variations of the first monomer series have a different influence on polymer properties than the homologous variations of the second monomer series. This is disclosed in the specification at page 21, lines 3-9, as well as at page 5, lines 23-25. Claim 10, on the other hand, has been amended to more specifically state that the first series of monomers homologously varies along the monomer backbone, while the second series of monomers homologously varies at one substituent group. This is disclosed in the specification at page 5, lines 13-22, as well as page 21, lines 3-12. These amendments to claims 1 and 10 also do not introduce new matter.

In view of the above claim amendments, the within application is believed to be in condition for allowance. Reconsideration of the rejections made by the Examiner is therefore respectfully requested.

Turning to the Official Action, the enablement rejection under 35 U.S.C. § 112, first paragraph of claims 1-3, 5, 9, 10, 14, 17-21, 23, 24, 26 and 27 was maintained by the Examiner. The Examiner questioned the ability of the disclosed invention to provide sufficient support to enable one of ordinary skill in the art to practice the invention over the entire scope of the claimed subject matter. The Examiner noted that the claims were completely open-ended with respect to the number of homologically varying monomer series co-reacted, as well as the number of homologically varying monomer species within a monomer series. This rejection is respectfully traversed in view of the above claim amendments for the reasons set forth hereinafter.

Claims 1 and 10 have been amended to limit the copolymer libraries to libraries containing only strictly alternating A-B type copolymers. The claims are no longer open-ended in this regard and are limited to A-B copolymers only, for which there exists as a polymer class enabling support in the specification. It should be noted that claim 10 is further limited to strictly alternating A-B copolymers that are condensation polymers.

Regarding the enablement of all possible monomer series and all possible monomer species within a monomer series, claim 1 has been amended to state that the homologous variations of the first and second monomer series are selected to be complimentary to one and another so that the homologous variations of the first monomer series have a different influence on polymer properties than the homologous variations of the second monomer series. Claim 10 has been amended to limit the first monomer series to monomers homologously varying along the monomer backbone and the second monomer series to monomers with a homologously varying substituent group. The classes of monomers and monomer species within a monomer class are now limited in scope to that which is enabled by the specification.

First, the monomers of claims 1 and 10 can only be those that produce strictly alternating A-B type copolymers. Classes of co-monomers that produce such copolymers are readily identified by those of ordinary skill in the art. The present invention resides not in the identification of such homologous variations, but in the selection of such homologous variations for the construction of combinatorial polymer libraries.

With respect to claim 1, wherein the monomer species within each co-monomer class are limited to first and second homologously varying series selected so that the variations of the first series have a different influence on polymer properties and the variations of the second series (and vice-versa), with the claims now limited to A-B type strictly alternating co-polymers, such monomer series are readily identified by those having ordinary skill in the art without undue

experimentation. Examples of such variations are given at page 21, lines 3-5. Guided by the specification, those of ordinary skill in the art can readily identify suitable series of co-monomers. The invention resides in the recognition that the homologously varying monomer series must be complimentary, and not in the discovery of homologously varying complimentary monomer series.

With respect to claim 10, this claim has been further limited to species of the claim 1 monomer series that are more specifically disclosed and therefore even further enabled by the specification. That is, the monomer species within each co-monomer class are limited to those homologously varying along the monomer backbone for one class of co-monomer, and those homologously varying at one substituent group for the other class of co-monomer. A number of examples of homologous monomer backbone variations are given in the specification at page 5, lines 13-22. So guided, those of ordinary skill in the art can readily identify other monomers within this definition. As far as monomers with one homologously varying constituent group are concerned, these also can be readily identified. The history of pharmaceutical research is replete with investigations of homologously varying a substituent group of a core small molecule under investigation. Thus, one of ordinary skill in the art will understand from reading the present specification how to homologously vary the first co-monomer along the monomer backbone and would know from the history of pharmaceutical research how to introduce a homologously varying substituent group in a series of monomers within a monomer class.

In summary, co-monomers that react to form strictly alternating A-B type copolymers can be readily identified. Homologously varying series of first and second co-monomers, each having a different influence on polymer properties than the other (and vice-versa) are also readily identified, especially when one monomer series is homologously varied along the monomer backbone and the other is varied at one substituent group. Claims 1 and 10 as amended, are now commensurate in scope with the level of enablement provided by the specification.

The Examiner also rejected claims 9 and 27 because the types of "chemical reactions" and/or "cross-linking" encompassed by these claims by which the copolymer libraries can be further modified was not enabled. It is implicit from the level of disclosure provided in the specification that applicants only intended these reactions to be those already conventional to the art. With the scope of the claimed subject matter now limited to strictly alternating A-B type copolymers, the types of further modifications that can be employed have been significantly limited and are readily identified by those familiar with the core co-polymerization process. Regardless, claims 9 and 27 represent additional features that can be introduced to the library and do not extend the scope of claims 1 and 10 beyond that enabled by the specification. As far as the other dependent claims are concerned, claim 19 has been cancelled, and claims 2, 3, 5, 14, 17, 18, 20, 21, 23, 24 and 26 further narrow the scope of claims 1 or 10 and therefore do not extend in scope beyond that already enabled for the independent claims.

Because the scope of the independent claims has been limited to that enabled by the specification, this rejection under 35 U.S.C. § 112, first paragraph has been overcome.

Reconsideration by the Examiner and withdrawal of this rejection is therefore respectfully requested.

Next, the rejection of claim 19 under 35 U.S.C. § 112, second paragraph as being indefinite was maintained for reasons of record. However, as noted above, claim 19 has been cancelled, without prejudice. Accordingly, this rejection has been rendered moot and its withdrawal is respectfully requested.

Next, claims 1-3, 5, 9, 10, 14, 17-21, 23, 24, 26 and 27 were rejected under 35 U.S.C. § 103(a) for obviousness over Kohn et al., U.S. Patent No. 5,216,115, the Gordon et al. journal article and Still et al., U.S. Patent No. 5,565,324. The same claims were also rejected under 35 U.S.C. § 103(a) as being unpatentable over Kohn et al. U.S. Patent No. 4,980,449, Gordon et al. and Still et al. The '115 Kohn et al. patent was cited as disclosing the synthesis of the claimed polyarylates and their intended uses. The other Kohn patent was cited as teaching polymers and polymerization processes of the invention not disclosed by the '115 Kohn et al. patent. The Examiner acknowledged that the Kohn patents did not disclose the synthesis of multi-dimensional polymer arrays, but cites the Gordon et al. journal article and the Still et al. patent as teaching this. The Examiner also disagreed with applicant's earlier argument that Still et al. and Gordon et al. taught against parallel synthesis techniques, or that Still et al. was limited to small molecule synthesis. This rejection is respectfully traversed in view of the above claim amendments for the reasons set forth hereinafter.

Independent claim 1 has been amended so that it is now limited to combinatorial library polymer arrays derived only from two homologously varying series of co-monomers selected so that the variations within one monomer series have a different influence on polymer properties than the variations of the other monomer series. Claim 10 is even further limited to a specific type of such co-variation, i.e. wherein one monomer series is homologously varied along the polymer backbone and the other is homologously varied at one substituent group. This has been discovered to result in a library of copolymers that exhibit unusually systematic and regular incremental variation in at least one key end use polymer property in a manner that can be correlated quantitatively to polymer structure.

There is no teaching in any of the above-cited prior art publications of a combinatorial co-polymer array derived from the two complementarily varying co-monomer series of claim 1 or the specifically varying co-monomer series of claim 10, let alone any suggestion that such arrays will process useful incremental structure-property correlations. Independent claims 1 and 10, as amended to define the relationship between the two homologously varying co-monomer series that results in the incremental structure-property correlations, patentably distinguish over the cited combinations of prior art of record.

Claims 2, 3, 5, 9, 14, 17, 18, 20, 21, 23, 24, 26 and 27 depend from claims 1 and 10 and are directed to allowable subject matter by the patentably distinguishing features of the two independent claims discussed above. By amending claims 1 and 10 to more particularly point out and distinctly claim these distinguishing features, this rejection of the claims under 35 U.S.C.

§ 103(a) in view of the cited prior art combinations has thus been overcome. Reconsideration by the Examiner and withdrawal of the rejections is therefore respectfully requested.

Finally, claims 1-3, 5, 9, 10, 14, 17, 18, 20, 21, 23, 24, 26 and 27 were rejected under 35 U.S.C. 102 (b) as being anticipated by Fiordeliso et al. Fiordeliso et al. was cited as disclosing five separately co-polymerized polyarylates that were synthesized from a homologously varying diacid series of monomers and a homologously varying series of diphenol monomers. This rejection is respectfully traversed in view of the above claim amendments for the reasons set forth hereinafter.

Claims 1 and 10 have been amended to clarify that the polymer libraries contain a number of homologously bivariant co-polymers sufficient to incrementally establish quantitative structure-property correlations. This is not disclosed by Fiordeliso et al.

This journal article is merely a survey of what at the time was a new class of aliphatic polyarylates. At page 509, in the paragraph "CONCLUSION," lines 11-13, the authors state, "although more data are necessary to identify quantitative relationships between polymer structure and a range of polymer properties, our preliminary studies revealed a number of useful structure-property correlations [(emphasis supplied)]."

Because of the small population of polymers studied, Fiordeliso et al.'s results were admittedly non-quantitative. Thus, Fiordeliso et al. fails to anticipate claims 1 and 10 as

amended under 35 U.S.C. 102(b) because it does not disclose an array of homologously bivariant co-polymers of sufficient number to incrementally establish quantitative structure-property correlations. Furthermore, there is no suggestion in Fiordeliso et al. that enlarging the co-polymer sample size by increasing the number of homologously varying co-monomers employ would produce such incrementally quantitative correlations.

Claims 1 and 10, as amended to require the polymer libraries to contain a number of homologously bivariant co-polymers sufficient to incrementally establish quantitative structure-property correlations, therefore patentably distinguish over Fiordeliso et al. under both 35 U.S.C. § 102(b) and § 103(a).

Claims 2, 3, 5, 9, 10, 14, 17, 18, 20, 21, 23, 24, 26 and 27 depend from claims 1 and 10 and are again directed to allowable subject matter by this feature added to the independent claims to patentably distinguish over Fiordeliso et al. By amending claims 1 and 10 in this manner, this rejection of the claims under 35 U.S.C. § 102(b) in view of Fiordeliso et al. has thus been overcome. Reconsideration by the Examiner and withdrawal of the rejection is therefore respectfully requested.

Accordingly, in view of the above claim amendments and the foregoing remarks, this application is now in condition for allowance. Reconsideration is respectfully requested. Attached hereto is a marked-up version of the changes made to the claims by the current